integrator configured, for example, as an amplifier 612 with a feedback path that includes a resistor 614 and capacitor 616.

The output from amplifier 612 is used to drive a voltage-controlled oscillator 618 to produce a frequency on the order of F_{VCO} of 1.2 to 1.525 GHz. The output from the VCO 618 is supplied via a feedback path 620 to the divider 610. The output from the VCO is also supplied to a mixer 622 which receives a second input from a phase locked oscillator 624 having a frequency on the order of 16.95 GHz. The oscillator 624 is also driven by the frequency reference oscillator 602.

An output from the mixer 622 is supplied via bandpass filter 624 and an amplifier 626 to a divider 628 to provide the exciter outputs designated LO/2, in two separate channels, each channel having an exemplary output frequency on the order of 18.15 to 18.475 GHz. 50 MHz reference outputs 630, 632 and 634 can also be provided from the reference oscillator 602. Control logic 636 can be configured in any conventional fashion to interface with the transmitter and receiver to control overall operation of the exciter.

Having described features of an exemplary circuit configuration for a transmitter and a receiver in accordance with the present invention, those skilled in the art will appreciate that the components can be combined into a single housing constituting a transceiver. Within the transceiver housing, the transmitter and receiver can be separately housed using, for example, hermitic seals for the transmitter and receiver, respectively. Exemplary embodiments employ a carrierless design for mounting the various components of the transmitter and receiver. Alternately, carriers can be employed in the housing.

For example, in a carrierless implementation of the Figure 1 transmitter, the components shown therein can be considered to be mounted within a hermitically sealed transmitter housing, with each of the components shown being mounted directly to the housing. The housing can, for example, be composed of a first material, and electrical components mounted to the housing can be composed of a second material, a coefficient of thermal expansion of the first material being matched to that of the second material. For example, the housing can be composed of a material that can be easily machined

including, but not limited to, silver and nickel/iron material (i.e., silvar), such that the housing is compatible with typical coefficients of thermal expansion, has a high thermal conductivity, and is easy to machine. However, those skilled in the art will appreciate that any materials can be used including, for example, materials such as ceramic aluminum, AlSiC, CuMo, CuW and/or Be/BeO with integrated circuits used to perform the various functions illustrated in Figure 1 being bonded directly to the housing. A similar configuration can be used with respect to the receiver of Figure 3, and with respect to the regulators of Figures 2 and 4 (the regulators can, of course, be mounted with the hermitically sealed housing of the transmitter or receiver, respectively).

In an alternate embodiment, carriers having matched coefficients of thermal expansion can be mounted in a housing. The housing can have a coefficient of thermal expansion which can be matched to the carriers, although this is not necessary, as an unmatched housing can be used.

Transmission lines used to interconnect the various components shown in Figures 1-4 can be configured using, for example, microstrip lines. For example, the transmission lines can be microstrip lines formed on quartz or fused silica. However, those skilled in the art will appreciate that any transmission media used to interconnect the components can be used in accordance with exemplary embodiments described therein.

It will be appreciated by those skilled in the art that the present invention can be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The presently disclosed embodiments are therefore considered in all respects to be illustrative and not restricted. The scope of the invention is indicated by the appended claims rather than the foregoing description and all changes that come within the meaning and range and equivalence thereof are intended to be embraced therein.